CLAIMS

1. An optical filter comprising:

at least one ring resonator that is apt to receive as input an optical signal having a plurality of channels from an input optical source; and

at least one unbalanced Mach-Zehnder module nested in said at least one ring resonator, wherein said at least one unbalanced Mach-Zehnder module and said at least one ring resonator are apt to filter at least one selective channel from said optical signal.

2. The optical filter of claim 1, wherein said at least one unbalanced Mach-Zehnder module comprises an absorber.

3. The optical filter of claim 1, wherein said at least one ring resonator comprises two or more ring resonators.

4. The optical filter of claim 3, wherein said at least one unbalanced Mach-Zehnder module comprises three unbalanced MZI structures.

5. The optical filter of claim 3, wherein said at least one unbalanced Mach-Zehnder module comprises two unbalanced MZI structures.

6. The optical filter of claim 1, wherein said at least one ring resonator comprises a SiO_2:Ge waveguide and SiO_2 cladding.

7. The optical filter of claim 1, wherein said at least one ring resonator comprises a SiON waveguide and SiO_2 cladding.

8. The optical filter of claim 1, wherein said at least one ring resonator comprises a Si_3N_4 waveguide and SiO_2 cladding.

9. The optical filter of claim 1 further comprising a tuning mechanism for tuning the properties of said optical filter.

10. The optical filter of claim 9, wherein said tuning mechanism tunes the properties of the optical filter thermally.

11. The optical filter of claim 9, wherein said tuning mechanism tunes the properties of the optical filter using electro-optic effect.

12. The optical filter of claim 1, wherein said optical filter is implemented in a fiber optical system.

13. The optical filter of claim 1, wherein said optical filter is implemented in a Planar Lightwave Circuit.

14. The optical filter of claim 1, wherein said at least one unbalanced MZI module is implemented along one arm of said least one ring resonator.

15. The optical filter of claim 1, wherein said at least one unbalanced MZI module is implemented along two arms of said least one ring resonator.

16. An optical filter comprising:

a plurality of filter arrangements including at least one ring resonator that is apt to receive as input an optical signal having a plurality of channels from an input optical source; and

at least one unbalanced Mach-Zehnder module nested in said at least one ring resonator, wherein said at least one unbalanced Mach-Zehnder module and said at least one ring resonator are apt to filter at least one selective channel from said optical signal.

17. The optical filter of claim 16, wherein said at one ring resonator comprises two or more ring resonators.

18. The optical filter of claim 17, wherein said at least one unbalanced Mach-Zehnder module comprises three unbalanced MZI structures.

19. The optical filter of claim 17, wherein said at least one unbalanced Mach-Zehnder module comprises two unbalanced MZI structures.

20. The optical filter of claim 16, wherein said at least one ring resonator comprises a SiO_2:Ge waveguide and SiO_2 cladding.

21. The optical filter of claim 16, wherein said at least one ring resonator comprises a SiON waveguide and SiO_2 cladding.

22. The optical filter of claim 16, wherein said at least one ring resonator comprises a Si_3N_4 waveguide and SiO_2 cladding.

23. The optical filter of claim 16 further comprising a tuning mechanism for tuning the properties of said optical filter.

24. The optical filter of claim 23, wherein said tuning mechanism tunes the properties of the optical filter thermally.

25. The optical filter of claim 23, wherein said tuning mechanism tunes the properties of the optical filter using electro-optic effect.

26. The optical filter of claim 16, wherein said optical filter is implemented in a fiber optical system.

27. The optical filter of claim 16, wherein said optical filter is implemented in a Planar Lightwave Circuit.

28. The optical filter of claim 16, wherein said at least one unbalanced MZI module is implemented along one arm of said least one ring resonator.

29. The optical filter of claim 16, wherein said at least one unbalanced MZI module is implemented along two arms of said least one ring resonator.

30. A method of optical filtering, said method comprising:

providing at least one ring resonator that receives as input an optical signal having a plurality of channels from an input optical source; and

providing at least one unbalanced Mach-Zehnder module nested in said at least one ring resonator, wherein said at least one unbalanced Mach-Zehnder module and

said at least one ring resonator filtering at least one selective channel from said optical signal.

31. The method of claim 30, wherein said at least one unbalanced Mach-Zehnder module comprises an absorber.

32. The method of claim 30, wherein said at one ring resonator comprises two or more ring resonators.

33. The method of claim 32, wherein said at least one unbalanced Mach-Zehnder module comprises three unbalanced MZI structures.

34. The method of claim 32, wherein said at least one unbalanced Mach-Zehnder module comprises two unbalanced MZI structures.

35. The method of claim 30, wherein said at least one ring resonator comprises a SiO_2:Ge waveguide and SiO_2 cladding.

36. The method of claim 30, wherein said at least one ring resonator comprises a SiON waveguide and SiO_2 cladding.

37. The method of claim 30, wherein said at least one ring resonator comprises a Si_3N_4 waveguide and SiO_2 cladding.

38. The method of claim 30 further comprising tuning the properties of said optical filter.

39. The method of claim 38, wherein said tuning the properties of the optical filter is done thermally.

40. The method of claim 38, wherein said tuning the properties of the optical filter is done using electro-optic effect.

41. The method of claim 30, wherein said optical filter is implemented in a fiber optical system.

42. The method of claim 30, wherein said optical filter is implemented in a Planar Lightwave Circuit.

43. The method of claim 30, wherein said at least one unbalanced MZI module is implemented along one arm of said least one ring resonator.

44. The method of claim 30, wherein said at least one unbalanced MZI module is implemented along two arms of said least one ring resonator.

45. A method of optical filtering, said method comprising:

providing a plurality of filter arrangement including at least one ring resonator that receives as input an optical signal having a plurality of channels from an input optical source; and

providing at least one unbalanced Mach-Zehnder module nested in said at least one ring resonator, wherein said at least one unbalanced Mach-Zehnder module and said at least one ring resonator filtering at least one selective channel from said optical signal.

1 46. The method of claim 45, wherein said at one ring resonator comprises two or more
2 ring resonators.

1 47. The method of claim 46, wherein said at least one unbalanced Mach-Zehnder
2 module comprises three unbalanced MZI structures.

1 48. The method of claim 46, wherein said at least one unbalanced Mach-Zehnder
2 module comprises two unbalanced MZI structures.

1 49. The method of claim 45, wherein said at least one ring resonator comprises a
2 SiO_2:Ge waveguide and SiO_2 cladding.

1 50. The method of claim 45, wherein said at least one ring resonator comprises a SiON
2 waveguide and SiO_2 cladding.

1 51. The method of claim 45, wherein said at least one ring resonator comprises a Si_3N_4
2 waveguide and SiO_2 cladding.

1 52. The method of claim 45 further comprising tuning the properties of said optical
2 filter.

1 53. The method of claim 52, wherein said tuning the properties of the optical filter is
2 done thermally.

1 54. The method of claim 52, wherein said tuning the properties of the optical filter is
2 done using electro-optic effect.

1 55. The method of claim 45, wherein said optical filter is implemented in a fiber
2 optical system.

1 56. The method of claim 45, wherein said optical filter is implemented in a Planar
2 Lightwave Circuit.

1 57. The method of claim 45, wherein said at least one unbalanced MZI module is
2 implemented along one arm of said least one ring resonator.

1 58. The method of claim 45, wherein said at least one unbalanced MZI module is
2 implemented along two arms of said least one ring resonator.